



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen11

(2.70 GHz, AMD EPYC 9334)

SPECspeed®2017_fp_base = 321

SPECspeed®2017_fp_peak = 326

CPU2017 License: 3

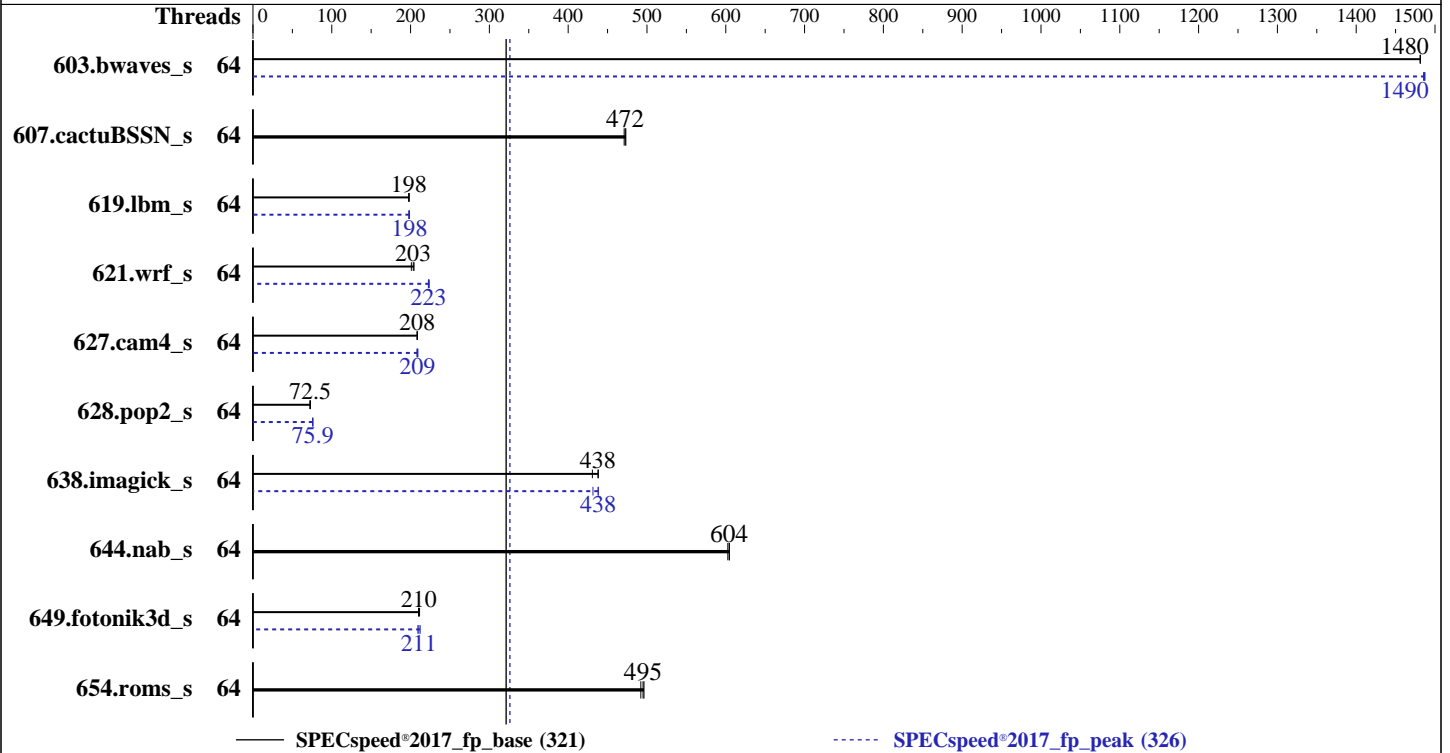
Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022



Hardware

CPU Name: AMD EPYC 9334
 Max MHz: 3900
 Nominal: 2700
 Enabled: 64 cores, 2 chips
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 128 MB I+D on chip per chip,
 32 MB shared / 8 cores
 Other: None
 Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: Ubuntu 22.04.1 LTS
 Kernel 5.15.0-43-generic
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: Yes
 Firmware: HPE BIOS Version v1.12 11/24/2022 released
 Nov-2022
 File System: ext4
 System State: Run level 5 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: None
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	64	39.8	1480	39.8	1480	<u>39.8</u>	<u>1480</u>	64	39.7	1490	<u>39.7</u>	<u>1490</u>	39.7	1490
607.cactuBSSN_s	64	<u>35.3</u>	<u>472</u>	35.4	471	35.2	473	64	<u>35.3</u>	<u>472</u>	35.4	471	35.2	473
619.lbm_s	64	<u>26.5</u>	<u>198</u>	26.4	198	26.5	198	64	<u>26.4</u>	<u>198</u>	26.5	198	26.4	199
621.wrf_s	64	64.7	204	<u>65.0</u>	<u>203</u>	65.8	201	64	<u>59.3</u>	<u>223</u>	59.4	223	59.1	224
627.cam4_s	64	42.5	209	42.6	208	<u>42.5</u>	<u>208</u>	64	42.6	208	42.4	209	<u>42.4</u>	<u>209</u>
628.pop2_s	64	<u>164</u>	<u>72.5</u>	164	72.4	163	72.9	64	157	75.8	156	76.0	<u>156</u>	<u>75.9</u>
638.imagick_s	64	<u>33.0</u>	<u>438</u>	32.9	438	33.5	431	64	32.9	438	<u>32.9</u>	<u>438</u>	33.4	431
644.nab_s	64	29.0	603	<u>28.9</u>	<u>604</u>	28.9	605	64	29.0	603	<u>28.9</u>	<u>604</u>	28.9	605
649.fotonik3d_s	64	<u>43.4</u>	<u>210</u>	43.1	211	43.4	210	64	43.6	209	43.0	212	<u>43.3</u>	<u>211</u>
654.roms_s	64	<u>31.8</u>	<u>495</u>	32.0	492	31.7	496	64	<u>31.8</u>	<u>495</u>	32.0	492	31.7	496

SPECSpeed®2017_fp_base = **321**

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at <http://developer.amd.com/amd-aocc/>

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations,

(Continued on next page)



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Operating System Notes (Continued)

```
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
```

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc400_genoa_B_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"
```

Environment variables set by runcpu during the 603.bwaves_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 619.lbm_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 621.wrf_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 627.cam4_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 628.pop2_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 638.imagick_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 649.fotonik3d_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

```
PGHPPF_ZMEM = "yes"
```



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General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Platform Notes

BIOS Configuration

Workload Profile set to General Peak Frequency Compute

Determinism Control set to Manual

Performance Determinism set to Power Deterministic

AMD SMT Option set to Disabled

Last-Level Cache (LLC) as NUMA Node set to Enabled

ACPI CST C2 Latency set to 18 microseconds

Memory PStates set to Disabled

Thermal Configuration set to Maximum Cooling

The system ROM used for this result contains microcode version 0xa10110e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version GenoaPI 1.0.0.1-L6

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on admin1 Thu Dec 8 23:21:07 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : AMD EPYC 9334 32-Core Processor

2 "physical id"s (chips)

64 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 32

siblings : 32

physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

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Platform Notes (Continued)

From lscpu from util-linux 2.37.2:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         52 bits physical, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                64
On-line CPU(s) list:  0-63
Vendor ID:             AuthenticAMD
Model name:            AMD EPYC 9334 32-Core Processor
CPU family:            25
Model:                 17
Thread(s) per core:   1
Core(s) per socket:   32
Socket(s):             2
Stepping:              1
Frequency boost:      enabled
CPU max MHz:          3911.0000
CPU min MHz:          400.0000
BogoMIPS:              5391.92
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfmpperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb
bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc arat
npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq
la57 rdpid overflow_recov succor smca fsrm flush_lld
Virtualization:       AMD-V
L1d cache:            2 MiB (64 instances)
L1i cache:            2 MiB (64 instances)
L2 cache:             64 MiB (64 instances)
L3 cache:             256 MiB (8 instances)
NUMA node(s):         8
NUMA node0 CPU(s):   0-7
NUMA node1 CPU(s):   16-23
NUMA node2 CPU(s):   24-31
NUMA node3 CPU(s):   8-15
NUMA node4 CPU(s):   32-39
NUMA node5 CPU(s):   48-55

```

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Platform Notes (Continued)

```

NUMA node6 CPU(s):           56-63
NUMA node7 CPU(s):           40-47
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:           Not affected
Vulnerability Mds:           Not affected
Vulnerability Meltdown:      Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1:     Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2:     Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
Vulnerability Srbds:         Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	2M	8	Data	1	64	1	64
L1i	32K	2M	8	Instruction	1	64	1	64
L2	1M	64M	8	Unified	2	2048	1	64
L3	32M	256M	16	Unified	3	32768	1	64

/proc/cpuinfo cache data

cache size : 1024 KB

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

```

available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 193223 MB
node 0 free: 192742 MB
node 1 cpus: 16 17 18 19 20 21 22 23
node 1 size: 193533 MB
node 1 free: 193092 MB
node 2 cpus: 24 25 26 27 28 29 30 31
node 2 size: 193533 MB
node 2 free: 193193 MB
node 3 cpus: 8 9 10 11 12 13 14 15
node 3 size: 193533 MB
node 3 free: 193235 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 193533 MB
node 4 free: 193042 MB
node 5 cpus: 48 49 50 51 52 53 54 55
node 5 size: 193500 MB
node 5 free: 193002 MB

```

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Platform Notes (Continued)

```

node 6 cpus: 56 57 58 59 60 61 62 63
node 6 size: 193490 MB
node 6 free: 192812 MB
node 7 cpus: 40 41 42 43 44 45 46 47
node 7 size: 193533 MB
node 7 free: 193050 MB
node distances:
node  0  1  2  3  4  5  6  7
  0: 10 11 11 11 32 32 32 32
  1: 11 10 11 11 32 32 32 32
  2: 11 11 10 11 32 32 32 32
  3: 11 11 11 10 32 32 32 32
  4: 32 32 32 32 10 11 11 11
  5: 32 32 32 32 11 10 11 11
  6: 32 32 32 32 11 11 10 11
  7: 32 32 32 32 11 11 11 10

```

From /proc/meminfo

MemTotal: 1585032728 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

/sbin/tuned-adm active

Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

/usr/bin/lsb_release -d

Ubuntu 22.04.1 LTS

From /etc/*release* /etc/*version*

debian_version: bookworm/sid

os-release:

PRETTY_NAME="Ubuntu 22.04.1 LTS"

NAME="Ubuntu"

VERSION_ID="22.04"

VERSION="22.04.1 LTS (Jammy Jellyfish)"

VERSION_CODENAME=jammy

ID=ubuntu

ID_LIKE=debian

HOME_URL="https://www.ubuntu.com/"

uname -a:

Linux admin1 5.15.0-43-generic #46-Ubuntu SMP Tue Jul 12 10:30:17 UTC 2022 x86_64 x86_64 x86_64 GNU/Linux

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Platform Notes (Continued)

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):	Not affected
CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	Not affected
CVE-2017-5754 (Meltdown):	Not affected
mmio_stale_data:	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 5 Jun 28 00:00

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv	ext4	98G	17G	77G	18%	/

```
From /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL365 Gen11
Product Family: ProLiant
Serial:          DL365G11-003
```

Additional information from dmidecode 3.3 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

```
Memory:
  24x Hynix HMCG94AEBRA103N 64 GB 2 rank 4800
```

```
BIOS:
  BIOS Vendor:      HPE
  BIOS Version:     1.12
  BIOS Date:        11/24/2022
  BIOS Revision:    1.12
  Firmware Revision: 1.10
```

(End of data from sysinfo program)



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Compiler Version Notes

=====
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on

(Continued on next page)



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Compiler Version Notes (Continued)

```

LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
-----

```

Base Compiler Invocation

C benchmarks:

clang

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Base Portability Flags

```

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

```



SPEC CPU®2017 Floating Point Speed Result

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(Test Sponsor: HPE)

ProLiant DL365 Gen11

(2.70 GHz, AMD EPYC 9334)

SPECspeed®2017_fp_base = 321

SPECspeed®2017_fp_peak = 326

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Base Optimization Flags

C benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -lflang
```

Benchmarks using both Fortran and C:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```



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Base Other Flags

C benchmarks:

`-Wno-return-type -Wno-unused-command-line-argument`

Fortran benchmarks:

`-Wno-unused-command-line-argument`

Benchmarks using both Fortran and C:

`-Wno-return-type -Wno-unused-command-line-argument`

Benchmarks using Fortran, C, and C++:

`-Wno-return-type -Wno-unused-command-line-argument`

Peak Compiler Invocation

C benchmarks:

`clang`

Fortran benchmarks:

`flang`

Benchmarks using both Fortran and C:

`flang clang`

Benchmarks using Fortran, C, and C++:

`clang++ clang flang`

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

`619.lbm_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000`

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Peak Optimization Flags (Continued)

619.lbm_s (continued):

```
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt  
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

638.imagick_s: Same as 619.lbm_s

644.nab_s: basepeak = yes

Fortran benchmarks:

```
603.bwaves_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP  
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math  
-fopenmp -Mrecursive -mllvm -reduce-array-computations=3  
-fvector-transform -fscalar-transform -fopenmp=libomp  
-lomp -lamdlibm -lamdalloc -lflang
```

```
649.fotonik3d_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP  
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math  
-fopenmp -flto -Mrecursive  
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp  
-lomp -lamdlibm -lamdalloc -lflang
```

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

```
621.wrf_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast  
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp  
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50  
-fremap-arrays -fstrip-mining  
-mllvm -inline-threshold=1000  
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt  
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop  
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

```
627.cam4_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast  
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp  
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
```

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Peak Optimization Flags (Continued)

627.cam4_s (continued):

```
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

628.pop2_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fvector-transform -fscalar-transform
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

Peak Other Flags

C benchmarks:

```
-Wno-return-type -Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

Benchmarks using both Fortran and C:

```
-Wno-return-type -Wno-unused-command-line-argument
```

Benchmarks using Fortran, C, and C++:

```
-Wno-return-type -Wno-unused-command-line-argument
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>



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